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shall constitute the basis of the Saturday morning discussion of the Nineteenth Educational Conference of Academies and High Schools in Relations with the University of Chicago, to be held in November, 1905.

Respectfully submitted,

WILLIAM R. HARPER, *Chairman.*

GEORGE N. CARMAN,

J. STANLEY BROWN,

C. R. BARNES,

EMILY RICE,

GEORGE H. ROCKWOOD,

GEORGE E. VINCENT,

W. B. OWEN,

NATHANIEL BUTLER,

W. S. JACKMAN,

GEORGE H. LOCKE,

Members of the Commission.

After extended discussion this report was adopted. A motion was then carried that a committee of five be appointed by the chair, to which should be intrusted the appointment of the new commission of fifteen, and the arrangement of the program for the conference of 1905. The chair appointed the following committee: F. J. Miller, chairman; Spencer R. Smith, J. Stanley Brown, W. D. MacClintock George H. Locke.

THE STUDY OF TREES IN WINTER¹

CLIFTON D. HOWE
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There is no better index to the increasing popular interest in trees than the appearance of numerous books and aids to their identification. Since 1900 about twenty such books have appeared. While nearly all of them describe other characters more or less fully, the chief distinguishing characters in all but one of the books are the leaves. This restricts the study of trees to five months in the year. The opportunity for teachers is still more restricted, for when the leaves

¹ Read at the conference of the Departments of Botany and Zoölogy.

are in their best condition the schools are closed for the summer vacation. So in reality if teachers are dependent upon leaf characters for the identification of trees, their work in this line is limited to hardly more than two months in a year.

The identification of trees chiefly by their leaf characters has another disadvantage. It is apparent to some, at least, that such is not the best method. The distinctive characters of many, if not of most, trees are much more conspicuous when the leaves are gone. Some of the oaks, for example, are almost impossible of identification by their leaves; yet those same trees have such distinguishing characters that they may be distinguished at a distance when there are no leaves on the trees.

The distinguishing characters of a leafless tree, in order of their importance, may be given as follows:

1. *The character of the bark* (color; thick or thin; rough or smooth; grooved or ungrooved; peeling off longitudinally or transversely; in patches or in strips).—The white oak has a very light-colored bark which distinguishes it from all other oaks in this vicinity. Add to this character the fact that the bark often peels off in thin scales somewhat like those of the shag-bark hickory, and one may be still more sure of the white oak. The swamp white oak bark also has a tendency to scale, but the two trees can be told apart for two reasons: the bark of the swamp white oak is much darker colored than that of the white oak; and, in addition, while the scaling of the white oak is most conspicuous on the main stem and older branches, the scaling of the swamp white oak is more pronounced on the younger branches giving the top of the tree its characteristic shaggy appearance.

The bur oak, or the scrub oak, as it is sometimes called, has a thick, deeply grooved bark, and this grooving extends up into the tree even to the smaller branches. This gives the top of the tree a heavy, scraggly appearance. In the black oak, which often grows beside the bur oak, the grooving is not so pronounced. It does not extend into the upper branches, but, on the contrary, these remain quite smooth. These trees can be told apart as far as seen by this one character—a thing that cannot be done when they are covered with leaves.

2. *The character of the small branches* (alternate or opposite;

size; color; rough or smooth).—So far as the bark is concerned, the white ash and the basswood look much alike and are sometimes confused, especially when the trees are young or when they grow crowded in a forest. The branches of the basswood are alternately, while those of the ash are oppositely, arranged on the stem. This character readily distinguishes the two trees.

The bark of the ash and the box-elder look alike, and both have opposite branches, but there is a striking difference in the number and size of the branchlets. Those of the box-elder are abundant and small, while those of the ash are fewer and rather coarse. The result is that the ash has an open top, with comparatively few, conspicuous, rigid branches, the uppermost of which look like crosses outlined against the sky; while the box-elder has a comparatively thick top, with abundant small delicate branches, the outermost of which often turn upward.

The color of the branches aids in distinguishing certain oaks which otherwise resemble each other closely. For example, recalling what was said of the white oak and the swamp white oak, the branchlets of the white oak are gray-green, while those of the swamp white oak are yellow-green. Those of the white are mottled, and those of the swamp white are not. The black oak and red oak often grow together, and they are sometimes hard to distinguish in the absence of the fruit. A close inspection of the season's shoots, however, will show those of the red oak quite distinctly reddish in color, while those of the black oak are a uniform gray. It is often hard to tell the butternut and the black walnut apart. Their leaves are alike, and their bark is alike. The branchlets of the butternut, however, are covered with sticky hairs, while those of the black walnut are smooth.

3. *The character of the winter buds* (color; size; shape; position; scales).—The bud characters are often more pronounced than the leaf characters. This is true of the red maple and sugar maple. It sometimes takes close study to tell their leaves apart, whereas when the leaves are gone and the winter buds exposed, the problem of distinguishing the two trees is much simpler, for even in winter the buds of the red maple are much redder than those of the sugar maple. Moreover, the red maple buds are blunt and rounded at

their points, while the sugar maple buds have acute points. There is still another difference: the sugar maple bud is covered with a soft pubescence, while the red maple bud is smooth and polished.

We must confess that the leaf of the silver maple is its best distinguishing character. That characteristic deeply lobed leaf, with its conspicuously lighter colored under side, distinguishes it from all the other native maples. Unfortunately, in this case, the leaves are present only half of the year, so we must distinguish it in winter conditions from the red maple, which it most closely resembles. The buds of both are in groups at the ends of short branches, and they are both conspicuously red; but the groups in the red maple are larger, and the shoots on which they are borne are shorter, thicker, and more stubby in appearance. On the silver maple the little branches are more flexible and swing out into sprays. As they unfold in the spring, the bud scales of the silver maple have a row of little hairs on their margins—a character which is absent in the red maple.

It is sometimes difficult to tell the pignut hickory and the bitternut hickory apart. The leaves are very much alike, the bark is very much alike, but each tree has very characteristic winter buds. Those of the bitternut, especially the terminal, are long, narrow, and curved like a scythe, and their orange-yellow color distinguishes them from all other hickories. The buds of the bitternut are round and yellowish-brown, and they are smaller than those of all the other hickories.

4. *The character of the leaf-scar* (position; size; shape; imbedded or projected).—The leaf-scars are not so conspicuous as some of the other characters, but they are just as distinctive in many cases. For example, if all the characters which we have mentioned for the white ash and box-elder fail, we can tell them apart by their leaf-scars. Those of the box-elder are smaller, not so prominent, and are V-shaped, while those of the ash are large, projecting, and broadly triangular in outline. We found that the butternut was distinguished from the black walnut because of its sticky pubescent branchlets. We can now add to this character the difference in the leaf-scars. The leaf-scars of the butternut in outline are much like those of the ash, but they are larger and more conspicuous. They always can be told from the ash, of course, because they are arranged alternately on the stem, while on the ash they are opposite. The scar of the

black walnut is smaller, with a depression at the top in which the bud is placed. The butternut scar has a fringe of hairs just above it, while the black walnut is smooth in this place.

5. *The general habit of the tree.*—We are familiar with the graceful outlines of an elm, and we recognize it at a distance by its general appearance. Most other trees have habits just as characteristic, when we once learn to know them. A careful study from this point of view will yield very interesting results.

We teachers must first get the “tree feeling” ourselves, and then transfer that feeling to our students. A tree is the most successful form of plant life on the face of the earth, and we admire it for that. When we know it intimately, our admiration increases. When we realize the vast amount of work it performs in gathering in the elements from the air and soil, and in transforming them into great shafts of wood, we marvel at its power. The study of trees is not only a pleasure from an æsthetic standpoint, but it also is of importance from the educational and economic standpoints. And right here is where the teachers have a mission. The destruction of our forests and the depletion of the lumber supply are one of the most important internal economic problems that confront the country. The forests are not being destroyed because of avarice and greed, as we are often led to believe, but because of the ignorance of the life-habits and the requirements of the trees. If you teach your students to know the trees, their habits and conditions of growth, and really to appreciate them in all their aspects, you will be creating a public opinion that will not allow the destruction of the forests. This does not mean that the forests should not be cut. They should be cut; but they should be cut in such a way as not to destroy their productiveness.

WINTER HABITS OF BIRDS¹

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Of the nearly two hundred birds which may be seen during a year in a region like this about Chicago, scarcely more than fifty will remain during the winter proper. Of these fifty about twenty will

¹ Read at the conference of the Departments of Botany and Zoölogy.